

Global and regional IUCN red list assessments: 12

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Abstract

In this contribution, the conservation status assessment of two vascular plants according to IUCN categories and criteria are presented. It includes the assessment of *Genista nuragica* Bacch., Brullo & Giusso and *Jacobaea incana* (L.) Veldkamp at global level.

Keywords

Conservation, extinction risk, IUCN protocol, threats

How to contribute

The text of the global and regional assessments should be submitted electronically to Simone Orsenigo (simone.orsenigo@unipv.it) or to Giuseppe Fenu (gfenu@unica.it); the text, up to 8000 characters in length (spaces included), must include a distribution map and a picture of the assessed species.

Red List Assessments

Genista nuragica Bacch., Brullo & Giusso

Global assessment

Taxonomy and nomenclature

Order: Fabales *Family*: Fabaceae

Genista nuragica Bacch., Brullo & Giusso, Phytotaxa 449: 32 (2020).

Common name: Ginestra nuragica (It), Nuragic broom (En).

Geographic distribution range: *Genista nuragica* (Fig. 1) is an evergreen dwarf shrub that occurs only in the Barbaricino biogeographic sector (Fenu et al. 2014), on the mountain stands of Montarbu di Seui (CE Sardegna), on rocky formations locally known as “Tacchi d’Ogliastra” (Bacchetta et al. 2020; Fig. 2).

Distribution: *Countries of occurrence*: Italy (Sardegna).

Biology: *Plant growth form*: Perennial (nanophanerophyte).

Flowering and fruiting time: flowering from May to June, fruiting from June to July (Bacchetta et al. 2020).



Figure 1. *Genista nuragica* at Montarbu di Seui (CE Sardegna). Photograph by Gianluigi Bacchetta.

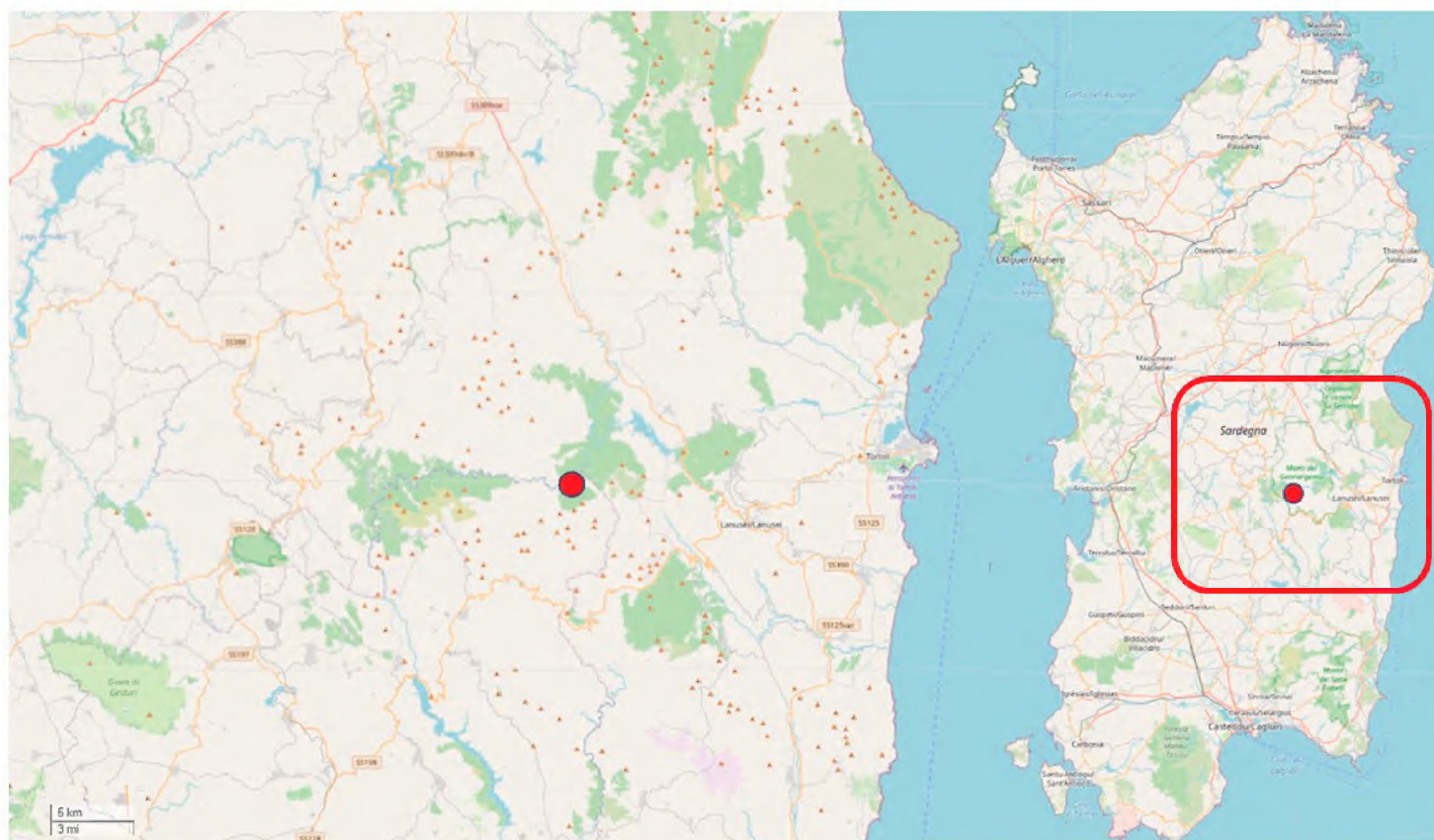


Figure 2. Geographic range and distribution map of *Genista nuragica* in Sardinia.

Reproduction: no information on pollination, dispersal strategy and seed germination is available.

Habitat and ecology: *Genista nuragica* grows on Mesozoic limestones at an elevation of 1250–1310 m a.s.l., on windy ridges characterized by lithosoils and Mediterranean pluvisessional oceanic bioclimate with a lower supramediterranean thermotype and lower humid ombrotype according to the Rivas-Martínez classification (Bacchetta et al. 2009). It is a member of orophilous dwarf shrub plant communities characterized by the occurrence of some endemic taxa, such as *Anthyllis hermanniae* L. subsp. *ichnusae* Brullo & Giusso, *Helianthemum morisianum* Bertol., and *Sesleria barbaricina* Arrigoni (Bacchetta et al. 2020).

Population information: There is no detailed information available on population dynamics. Preliminary observations indicate a stable population.

Threats: Despite the only known population consists of a reduced number of mature individuals growing in a small area, no significant or potential threats were observed for *G. nuragica*.

CRITERIA APPLIED

Criterion B: **EOO:** 8 km² calculated with GeoCAT (Geospatial Conservation Assessment Tool) software (Bachman et al. 2011).

AOO: 8 km² calculated with GeoCAT software (Bachman et al. 2011).

b) No continuous decline observed.

c) No extreme fluctuation observed.

Criterion D: the population consists of about 100 mature plants but no signals of decline were observed.

Red List category and Criteria (Global Assessment)

NT

Near Threatened

Rationale for the assessment: *Genista nuragica* is a plant narrow endemic to Sardegna currently occurring only in a small area at Montarbu (Seui); the unique population consists of a low number of mature plants. Although no significant threats were observed for this species, *Genista nuragica* could be affected in the near future by the effects of the ongoing climate change, such as extreme weather events, or the monitoring of population trends could prove the presence of a decline of this species. Therefore, this species is assessed as Near Threatened (NT) at global level with the expectation that it will qualify for Critically Endangered if monitoring indicates a decline or a plausible threat.

Previous assessment: The taxon is not evaluated (NE) at the global level (IUCN 2021).

Conservation actions: *Genista nuragica* is not protected by international, national and regional laws. At present, there are no conservation measures for this species in Sardegna. The only known population grows in an area protected by a SCI (“Monti del Gennargentu” ITB021103) and a National Park “Parco Nazionale del Golfo di Orosei e del Gennargentu” established in 1998 by a Presidential Decree (D.P.R. 30 March 1998). In addition, the unique population area falls inside a site managed by the public forestry administration (Forests Agency).

Conservation actions needed: Research activities and a monitoring programme are recommended in order to better understand the reproductive biology of the species and the population trend. Moreover, *in situ* and *ex situ* conservation actions should be designed for possible population reinforcement programmes, aimed at increasing the low number of individuals of the population.

A specific monitoring program would be important to prevent and evaluate the possible future threats (e.g., increasing grazing, human activities, or stochastic events), which could change the current conservation status of this plant.

Notes: *Genista nuragica* was described in a recent taxonomic revision of the taxa belonging to the *Genista salzmannii* DC. group of *G.* sect. *Erinacoides* Spach (Cytiseae, Fabaceae) occurring in Sardegna and Corsica. Within the species belonging to *Genista salzmannii* group, *G. nuragica* seems to be the most closely related to *G. desoleana* Vals., but several morphological features allow to distinguish these taxa. Furthermore, the two species have different ecological requirements, since *G. nuragica* is a calcicolous plant exclusively found on windy ridges, while *G. desoleana* is linked to siliceous volcanic substrates and grows on plateaux with developed soils at lower elevation never exceeding 1,000 m a.s.l.

Jacobaea incana (L.) Veldkamp

Global assessment

Taxonomy and nomenclature*Order*: Asterales *Family*: Asteraceae

Jacobaea incana (L.) Veldkamp, Compositae Newslett. 44: 7 (2006) $\equiv$ *Senecio incanus* L., Sp. Pl.: 869 (1753) $\equiv$ *Senecio leucophyllus* subsp. *incanus* (L.) Bonnier, Layens, Tabl. Syn. Pl. Vasc. France 163 (1894) $\equiv$ *Madaractis incana* Regel, Ind. Sem. Hort. Turic. 1847: 4 (1847) = *Senecio incanus* var. *parviflorus* (All.) Rouy, Fl. Fr. 8: 332 (1903)

Common name: Senecione biancheggiante (It), Séneçon blanchâtre (Fr), Gewöhnliches Graues Greiskraut (De), Hoary Groundsel (En).

Geographic distribution range: *Jacobaea incana* (Fig. 3) is endemic to western Alps (France, Italy, Switzerland) and northern Apennines (Mount Prado, Italy; Fig. 4).

Distribution: *Countries of occurrence:* France, Italy, and Switzerland.

Biology: *Plant growth form:* perennial (scapose hemicryptophyte) (Abeli et al. 2012). *Chromosome number:* $2n = 40$ (Signorini et al. 2001).

Flowering time: From June to August.

Reproduction: Entomophilous pollination. At maturity, the seeds are carried by the wind.

Habitat and ecology: *Jacobaea incana* grows in siliceous rocky outcrops, stony alpine meadows or moraines with an altitudinal range that varies from 1800 m to 2600 m a.s.l. (Schweingruber et al. 2020).

Population information: a single study based on long-term monitoring of the southernmost population at M. Prado (N-Apennines, Italy) shows that this *J. incana* population has been stable for about 20 years and number of flowering plants is slowly increasing (Abeli et al. 2012; TA personal observation).



Figure 3. *Jacobaea incana* at Mount Prado, Northern Apennines (Italy). Photograph by Thomas Abeli.

Threats: *2.3.1 Livestock Farming & Ranching (nomadic grazing):* Livestock (sheep, goats) represent a threat for the southernmost population at M. Prado and probably for other population in the Alps. Livestock represents a direct threat through grazing and trampling and an indirect threat through soil nutrient enrichment due to droppings deposition.

6.1 Recreational activities: Human trampling during the tourist season involves a progressive reduction in the population viability, in fact *J. incana* cover and sexual reproduction reached the lowest values (Rossi et al. 2009).

11.2 Droughts & 11.3 Temperature extremes: Extremely dry and hot summers with a high average temperatures and low rainfall can reduce the reproductive performance of the species (Abeli et al. 2012). In particular, studies indicate an intensification of the damage in the sites where *J. incana* is affected by trampling unfavourable climatic conditions (Rossi et al. 2009).

CRITERIA APPLIED

Criterion B: **AOO** : 39,300 km² (calculated with a 10 × 10 km grid on occurrence data from GBIF. These data have been corrected according to the literature on the distribution of the species. The occurrences referred to other subspecies of *J. incana* have been removed; see notes).

- a) Number of locations > 10
- b) No decline observed
- c) No extreme fluctuation observed

Red List category and Criteria (Global Assessment)

LC

Least Concern

Rationale for the assessment: This species has a wide distribution with no observed decline. The disjunct population of *J. incana* at M. Prado (N-Apennines, Italy) is stable and number of flowering plants is slowly increasing. None of the criteria are applicable.

Previous assessment: This taxon is not evaluated (NE) at the global level (IUCN 2021). At regional level, *J. incana* was assessed as LC in Switzerland (Bornand et al. 2016), while is NE in France (IUCN, France 2018).

Conservation actions: The population of M. Prado is being monitored for 20 years. Several populations are within protected areas like National Parks and Natura 2000 sites. There are twelve seed accession stored in the seed banks of the European Native Seed Conservation Network (<http://ensconet.maich.gr/About.htm>). These accessions are from Italy and Austria. Austrian accessions likely belong to *J. carniolica* (Willd.) Schrank, formerly considered a subspecies of *J. incana* (*J. incana* subsp. *carniolica* (Willd.) B.Nord. & Greuter). An update of the database is therefore needed. According to the Botanic Garden Conservation International database PlantSearch, there are at least four living collections of *J. incana* in botanic gardens worldwide; other collections are simply ascribed to *Senecio incanus*. As *J. incana* previously included three subspecies then split in as many species (see notes), it is not possible to understand

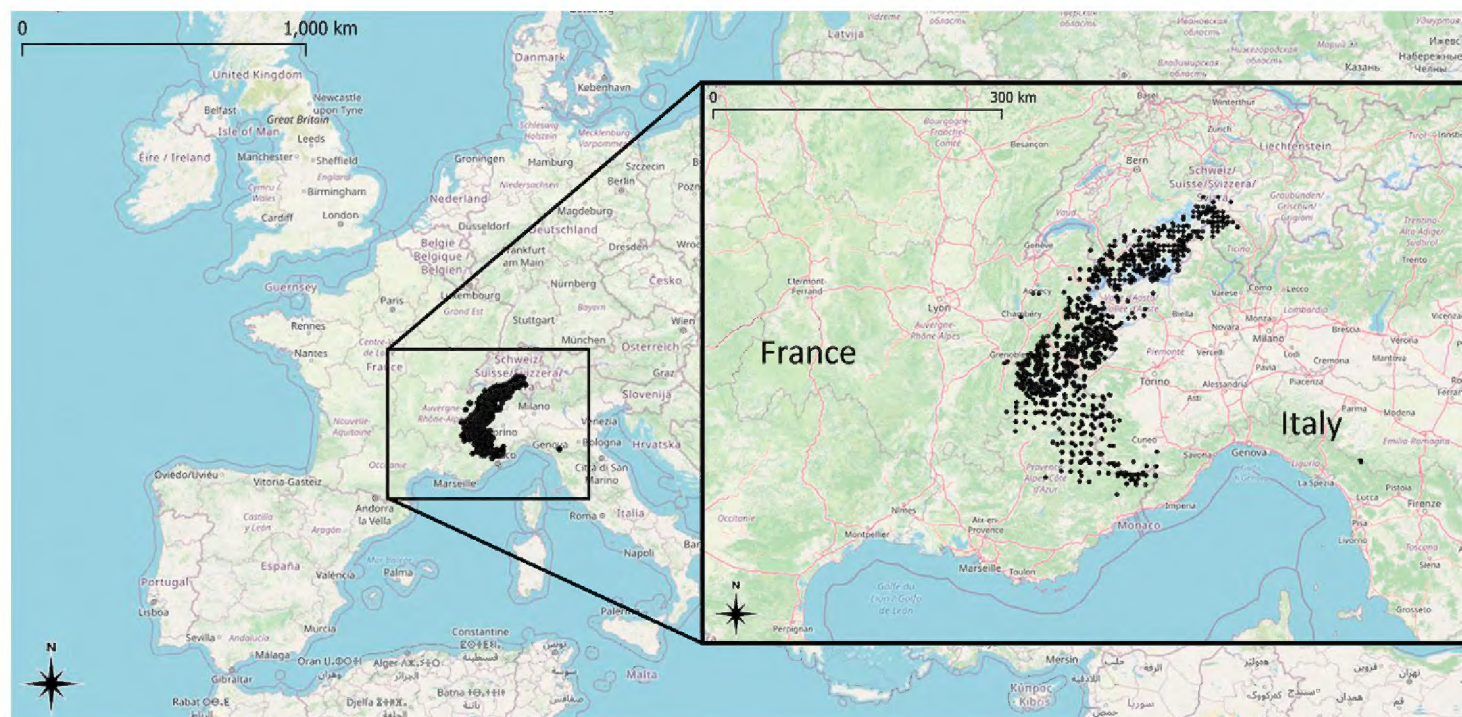


Figure 4. Global geographic range and distribution map of *Jacobaea incana*.

which of the subspecies are represented in these accessions (BGCI PlantSearch 2021; https://tools.bgci.org/plant_search.php).

Conservation actions needed: To reduce the negative effect of human and live-stock trampling, fences should be used. To balance the positive and negative effects of this conservation tool, it would be better to use temporary rather than permanent fences (Lorite et al. 2021) and monitoring the demographic trends of the populations in the following years. To increase the genetic diversity immediate *ex situ* conservation activities should be carried out, through seed collection and storage in seed banks. The taxonomy of the *ex situ* accessions available should be updated according to the recent splitting of the three subspecies of *J. incana* (L.) Veldkamp into as many species (see notes). Moreover, environmental education should be conducted in order to sensitise tourists to nature conservation with particular reference to threatened species.

Notes: *Jacobaea incana* formerly included three subspecies, i.e. *J. incana* subsp. *incana* (L.) Veldkamp, *J. incana* subsp. *insubrica* (Chenevard) B.Nord. & Greuter, *J. incana* subsp. *carniolica* (Willd.) B.Nord. & Greuter. These three subspecies are now considered as distinct species. *Jacobaea incana* (L.) Veldkamp occurs in the western Alps and Apennines, *J. insubrica* (Chenevard) Galasso & Bartolucci in central Alps of Italy and Switzerland; Caccianiga, 2011), while *J. carniolica* (Willd.) Schrank, shows a more eastern distribution.

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References

Abeli T, Rossi G, Gentili R, Mondoni A, Cristofanelli P (2012) Response of alpine plant flower production to temperature and snow cover fluctuation at the species range boundary. *Plant Ecology* 213(1): 1–13. <https://doi.org/10.1007/s11258-011-0001-5>

- Bacchetta G, Bagella S, Biondi E, Farris E, Filigheddu R, Mossa L (2009) Vegetazione forestale e serie di vegetazione della Sardegna (con rappresentazione cartografica alla scala 1:350.000). *Fitosociologia* 46(suppl. 1): 3–82.
- Bacchetta G, Brullo S, Feoli Chiapella L, Cusma Velari T, Fenu G, Giusso Del Galdo G (2020) Taxonomic remarks on *Genista salzmannii* group (Fabaceae) in Sardinia and Corsica. *Phytotaxa* 449: 31–51. <https://doi.org/10.11646/phytotaxa.449.1.4>
- Bachman S, Moat J, Hill AW, Torre J de la, Scott B (2011) Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. In: Smith V, Penev L (Eds) *E-Infrastructures for data publishing in biodiversity science*. *ZooKeys* 150: 117–126. <https://doi.org/10.3897/zookeys.150.2109>
- BGCI PlantSearch (2021) Botanic Garden Conservation International PlantSearch. https://tools.bgci.org/plant_search.php
- Bornand C, Gygax A, Juillerat P, Jutzi M, Möhl A, Rometsch S, Sager L, Santiago H, Eggenberg S (2016) Lista Rossa Piante vascolari. Specie minacciate in Svizzera. Ufficio federale dell'ambiente, Berna e Info Flora, Ginevra. Pratica ambientale n. 1621, 178 pp.
- Caccianiga M (2011) *Senecio incanus* L. subsp. *insubricus* (Chenevard) Br.-Bl. In: Rossi G, Abeli T, Foggi B, Orsenigo S, Tazzari E (Eds) *Schede per una Lista Rossa della Flora vascolare e crittogamica Italiana*. *Informatore Botanico Italiano* 43(2): 44–46.
- Fenu G, Fois M, Cañadas E, Bacchetta G (2014) Using endemic-plant distribution and geology in biogeography: the case of Sardinia (Mediterranean Basin). *Systematics and Biodiversity* 12(2): 181–193. <https://doi.org/10.1080/14772000.2014.894592>
- IUCN (2021) The IUCN Red List of Threatened Species vers. 2020-1. <http://www.iucnredlist.org>
- Lorite J, Salazar-Mendías C, Pawlak R, Cañadas E (2021) Assessing effectiveness of exclusion fences in protecting threatened plants. *Scientific Reports* 11: e16124. <https://doi.org/10.1038/s41598-021-95739-4>
- Rossi G, Parolo G, Ulian T (2009) Human trampling as a threat factor for the conservation of peripheral plant populations. *Plant Biosystems* 143(1): 104–113. <https://doi.org/10.1080/11263500802633725>
- Schweingruber FH, Dvorský M, Börner A, Doležal J (2020) Asteraceae–Senecioneae. In: *Atlas of Stem Anatomy of Arctic and Alpine Plants Around the Globe*. Springer, Cham, 65–81. https://doi.org/10.1007/978-3-030-53976-4_8
- Signorini MA, Foggi B, Mori B (2001) Mediterranean chromosome number reports 11 (1264–1270). *Flora Mediterranea* 11: 473–478.
- UICN France (2018) *La Liste Rouge des Espèces Menacées en France—Chapitre Flore Vasculaire de France Métropolitaine* (UICN France, FCBN, AFB, MNHN, 2018).